



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

## The Impact of Asthma on Mortality in Patients With COVID-19



### To the Editor:

There is ongoing need to characterize risk factors for coronavirus disease 2019 (COVID-19) morbidity

and mortality, and the role of chronic respiratory diseases such as asthma are not fully understood.<sup>1</sup> Here we describe results from the Mount Sinai Health System (MSHS) COVID-19 registry, with the objective to determine the prevalence of asthma in the MSHS COVID-19 registry and the association between a history of asthma and mortality.

### Methods

Anonymous data from the MSHS COVID-19 registry were downloaded, and ED and inpatient encounters were selected. This dataset contained patient demographics, borough of residence, vitals on arrival to the hospital, and prescribed medications during hospital admission. COVID-19 results were confirmed using reverse transcription polymerase chain reaction on nasopharyngeal swabs. A history of asthma was self-reported at the time of

testing. The main outcome in this study was mortality. Relevant cofounders included patient characteristics at admission and COVID-19 status. A sample size of 3,814 patients was needed to detect an association between asthma and mortality with 80% power, assuming an effect size of 3%, and a significance level of 0.05. All analyses were performed in SAS v9.4 (SAS Institute). This study was reviewed by the institutional review board of Mount Sinai and considered exempt.

### Results

There were 11,405 patients who experienced a COVID-19-related hospital encounter within the MSHS (February 29, 2020–April 24, 2020). Of these, 54.8% had confirmed COVID-19 and 45.2% had a COVID-19-negative test. Fifty-one percent of patients were women, mostly nonwhite (72.2%), with a median age of 57 years (interquartile range, 33); the patient's borough of residence was mostly Manhattan (42.1%), Brooklyn (24.5%), and Queens (18.9%). Asthma was self-reported by 618 patients (5.4%), including 4.4% of the patients with COVID-19, and 6.8% of the patients without COVID-19 ( $P < .0001$ ). Asthma prevalence was 8.8% in patients living in the Bronx, 7.6% in Manhattan, 4.6% in Staten Island, and 4.0% in Queens. Patients with an asthma history were between the ages of 40 and 69 years (48.6%), < 40 years (28.3%), and > 69 years (23.1%).

There were 618 patients treated with steroids, and 205 (33.1%) of them reported a history of asthma. Of those, 105 (51.2%) were treated with steroids orally and 100 (48.8%) intravenously. The most common steroids were methylprednisolone (44.9%), prednisone (44.4%), and dexamethasone (10.7%). A total of 101 patients with asthma (37.1%) who tested positive for COVID-19 were treated with steroids vs 104 patients (30.1%) who were COVID-19 negative ( $P = .0637$ ). Among those with a history of asthma, a larger proportion of those treated with steroids died (13.7%) compared with those who were not treated (6.3%) ( $P = .0023$ ).

At univariate analysis (Table 1), there was no statistically significant association between asthma status and mortality among patients with COVID-19 ( $P = .506$ ) and patients without COVID-19 ( $P = .187$ ). Multivariable logistic regression analysis (Table 2) adjusted for age, sex, race, and COVID-19

**TABLE 1** Prevalence of Self-reported Asthma and Mortality in Patients With and Without COVID-19

Asthma Status	COVID-19 Positive			COVID-19 Negative		
	Alive	Deceased	P Value	Alive	Deceased	P Value
No past history of asthma	4,890 (95.6)	1,083 (96.0)	.506	4,620 (93.2)	194 (95.6)	.187
History of asthma	227 (4.4)	45 (4.0)		337 (6.8)	9 (4.4)	

Values are No. (%) or as otherwise indicated. COVID-19 = coronavirus 2019.

**TABLE 2 ] Predictors of Mortality Among Patients With a History of Asthma**

Variable	Overall MSHS Registry (n = 11,405)	COVID-19 Positive Only (n = 6,245)
COVID-19 positive vs not detected	3.58 (2.99-4.29)	...
Asthma (yes vs no)	0.89 (0.65-1.21)	0.94 (0.66-1.34)
40-69 vs < 40 y	7.97 (4.94-12.88)	15.08 (6.69-34.01)
> 69 vs < 40 y	28.94 (17.99-46.55)	57.86 (25.72-130.17)
Female vs male	0.74 (0.64-0.86)	0.70 (0.59-0.82)
Nonwhite vs white	1.00 (0.85-1.17)	1.04 (0.87-1.25)

Values are adjusted OR (95% CI). Models were adjusted for all variables listed. MSHS = Mount Sinai Health System. See Table 1 legend for expansion of other abbreviation.

status shows that asthma was not associated with higher risk of mortality in the entire sample (adjusted OR, 0.89; 95% CI, 0.65-1.21) or among patients who tested positive for COVID-19 with a history of asthma (adjusted OR, 0.94; 95% CI, 0.66-1.34). The results suggest a low prevalence of asthma in the MSHS COVID-19 registry, and the lack of a statistically significant relationship between a history of asthma and mortality, irrespective of COVID-19 status.

## Discussion

This is the first analysis to our knowledge to comment on the relationship between asthma and mortality in a large COVID-19 sample in New York City. Here we report that self-reported asthma was not associated with mortality, even after accounting for COVID-19 status. We recognize the importance of characterizing the vulnerability of patients with asthma during the COVID-19 pandemic,<sup>2</sup> and assert that the lower asthma prevalence in patients with COVID-19 may be caused by underreporting in the MSHS database because asthma was self-reported. In fact, the age-adjusted prevalence of asthma in New York City overall (13.4%), and by borough (Bronx: 17.0%, Brooklyn: 12.4%, Manhattan: 15.5%, Queens: 11.6%, Staten Island: 9.9%), was higher than recorded in the MSHS population described here.<sup>3</sup> This analysis has several limitations including the following: asthma was self-reported, and information on treatments prior to admission, including inhaled or oral corticosteroids, was not available.

The lack of association between a personal history of asthma and mortality, irrespective of COVID-19 status, suggests further research is needed on the role of asthma in the immune response following viral respiratory infections and the role of asthma medications in individual response to COVID-19 infection.

*Wil Lieberman-Cribbin, MPH*

*Joseph Rapp, MPH*

*Naomi Alpert, MS*

*Stephanie Tuminello, MPH*

*Emanuela Taioli, MD, PhD*

*New York, NY*

**AFFILIATIONS:** From the Institute for Translational Epidemiology, Icahn School of Medicine at Mount Sinai

**FINANCIAL/NONFINANCIAL DISCLOSURES:** None declared.

**CORRESPONDENCE TO:** Emanuela Taioli, MD, PhD, One Gustave L. Levy Place, Box 1133, Icahn School of Medicine at Mount Sinai, New York, NY 10029; e-mail: [emanuela.taioli@mountsinai.org](mailto:emanuela.taioli@mountsinai.org)

Copyright © 2020 American College of Chest Physicians. Published by Elsevier Inc. All rights reserved.

**DOI:** <https://doi.org/10.1016/j.chest.2020.05.575>

## Acknowledgments

**Other contributions:** This work was supported in part through the computational and data resources and staff expertise provided by Scientific Computing at the Icahn School of Medicine at Mount Sinai.

## References

1. Halpin DM, Faner R, Sibila O, Badia JR, Agusti A. Do chronic respiratory diseases or their treatment affect the risk of SARS-CoV-2 infection? *Lancet Respir Med*. 2020;8(5):436-438.
2. Reflecting on World Asthma Day in the era of COVID-19. *Lancet Respir Med*. 2020;8(5):P423.
3. New York City Department of Health and Mental Hygiene. Community Health Survey 2017. Public use dataset. <https://www1.nyc.gov/site/doh/data/data-sets/community-health-survey-public-use-data.page>. Accessed April 28, 2020.